

**IN THE UNITED STATES  
PATENT AND TRADEMARK OFFICE**

J1046 U.S. PTO  
09/970743  
10/04/01

**PATENT APPLICATION**

**Inventor(s):** David Malah

**Docket No.:** 2001-0283

**Application No.:**

**Filing Date:**

**Examiner Name:**

**Group Art Unit:**

**Title:** A Method Of Bandwidth Extension for Narrowband Speech

**COMMISSIONER FOR PATENTS  
WASHINGTON, D.C. 20231**

**SIR:**

**INFORMATION DISCLOSURE STATEMENT**

Pursuant to 37 C.F.R. § 1.56, the attention of the Patent and Trademark Office is hereby directed to the references listed on the attached PTO/SB/08A. Unless otherwise indicated herein, one copy of each reference is attached. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the references be made of record therein and appear among the "References Cited" on any patent to issue therefrom.

- ☒ 1. This Information Disclosure Statement is being filed, within three months of the U. S. filing date; or within three months of the date of the entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application; or before the mailing date of a first Office Action on the merits; or before the mailing of a first Office Action after the filing of a request for continued examination under 37 C. F. R. § 1.114, whichever occurs last. No certification or fee is required, 37 C.F.R. § 1.97(b).
- ☐ 2. This Information Disclosure Statement is being filed more than three months of the U.S. filing date, or more than three months after the date of the entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application or after the mailing date of the first Office Action on the merits, but before the mailing date of either a Final Action under 37 C.F.R. § 1.113 or a Notice of Allowance under 37 C.F.R. § 1.311, whichever occurs first, 37 C.F.R. § 1.97(c).
- ☐ a. I hereby certify that each item of information contained in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this Information Disclosure Statement, 37 C.F.R. § 1.97 (e)(1), or

☐ b. I hereby certify that no item of information in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application or, to my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this Information Disclosure Statement, 37 C.F.R. § 1.97 (e)(2).

☐ c. Please debit Deposit Account No. 01-2745 in the amount of \$240.00 to cover the fee under 37 C.F.R. § 1.17(p) and to ensure consideration of the disclosed information. A duplicate copy of this paper is attached.

☐ 3. This Information Disclosure Statement is being filed after the mailing date of either a Final Action under 37 C.F.R. § 1.113 or a Notice of Allowance under 37 C.F.R. §1.311, whichever occurs first, but before payment of the Issue Fee, 37 C.F.R. §1.97(d).

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☐ c. Applicant(s) hereby petition(s) that the Information Disclosure Statement be considered.

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Respectfully,

Date:

10/4/01

By:

Thomas M. Isaacson

Thomas M. Isaacson, Attorney
Reg. No.: 44166
T: 410-257-5485
F: 732-368-6932

AT&T CORP.

P.O. Box 4110

Middletown, New Jersey 07748-4110

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**INFORMATION DISCLOSURE  
STATEMENT BY APPLICANT**

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C mplet If Known

Applicati n Number

Filing Date

First Named Inv nt r

David Malah

Group Art Unit

Examiner Name

Attorney Docket Number

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**U.S. PATENT DOCUMENTS**

Examiner Initials*	Cite No. <sup>1</sup>	U.S. Patent Document		Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document MM-DD-YYYY	Pages, Columns, Lines, Where Relevant Passages or Relevant Figure Appears
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**FOREIGN PATENT DOCUMENTS**

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		Office <sup>3</sup>	Number (if known)	Kind Code <sup>2</sup>				
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<sup>1</sup>Unique citation designation number. <sup>2</sup> See attached Kinds of U.S. Patent Documents <sup>3</sup> Enter Office that issued the document, by the two letter code (WIPO Standard ST.3). <sup>4</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>5</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>6</sup> Applicant is to place a check mark here if English language Translation is attached.

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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>  (use as many sheets as (necessary))				Applicant Number	
				Filing Date	
				First Named Inventor	David Malah
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				Examiner Name	
Sheet	1	of	6	Attorney Docket Number	2001-0283

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OTHER PRIOR ART -- NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article(when appropriate), title of the item(book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	<sup>2</sup>
	AA	"Statistical Recovery of Wideband Speech from Narrowband Speech," by Y. M. Cheng et al, IEEE Trans. Speech and Audio Processing, Vol. 2, No. 4, pp. 544-548, Oct. 1994.	<input type="checkbox"/>
	AB	"Bandwidth Enhancement of Narrow-Band Speech Signals," by H. Carl et al, Proc. European Signal Processing Conf. -EUSIPCO'94, pp. 1178-1181, 1994.	<input type="checkbox"/>
	AC	"An Algorithm to Reconstruct Wideband Speech from Narrowband Speech Based on Codebook Mapping," by Y. Yoshida, Proc. Intl. Conf. Spoken Language Processing, ICSLP'94, 1994.	<input type="checkbox"/>
	AD	"Quality Enhancement of Band Limited Speech by Filtering and Multirate Techniques," by H. Yasukawa, Proc. Intl. Conf. Spoken Language Processing, ICSLP'94, pp. 1607-1610, 1994.	<input type="checkbox"/>
	AE	"Speech Enhancement Based on Temporal Processing," by H. Hermansky et al, Proc. Intl. Conf. Acoust., Speech, Signal Processing, ICASSP'95, pp. 405-408, 1995.	<input type="checkbox"/>
	AF	"Enhancement of Telephone Speech Quality by Simple Spectrum Extrapolation Method," by H. Yasukawa, Proc. European Conf. Speech Comm. and Technology, EUROSPEECH'95, 1995.	<input type="checkbox"/>

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Sheet	2	of	6	Attorney Docket Number	2001-0283

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Examiner Initials*	Cite No. 1	Include name of the author (in CAPITAL LETTERS), title of the article(when appropriate), title of the item(book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>2</sup>
	AG	"Restoration of Wide Band Signal from Telephone Speech Using Linear Prediction Error Processing," by H. Yasukawa, Proc. Intl. Conf. Spoken Language Processing, ICSLP'96, pp. 901-904, 1996.	<input type="checkbox"/>
	AH	"Adaptive Filtering for Broad Band Signal Reconstruction Using Spectrum Extrapolation," by H. Yasukawa, Proc. IEEE Digital Signal Processing Workshop, pp. 169-172, 1996.	<input type="checkbox"/>
	AI	"A Simple Method of Broad Band Speech Recovery from Narrow Band Speech for Quality Enhancement," by H. Yasukawa, Proc. IEEE Digital Signal Processing Workshop, pp. 173-175, 1996.	<input type="checkbox"/>
	AJ	"Restoration of Wide Band Signal from Telephone Speech Using Linear Prediction Residual Error Filtering," by H. Yasukawa, Proc. IEEE Digital Signal Processing Workshop, pp. 176-178, 1996.	<input type="checkbox"/>
	AK	"Implementation of Frequency Domain Digital Filter for Speech Enhancement," by H. Yasukawa, Proc. Intl. Conf. Electronics, Circuits and Systems, ICECS'96, pp. 518-521, 1996.	<input type="checkbox"/>
	AL	"Signal Restoration of Broad Band Speech Using Nonlinear Processing," by H. Yasukawa, Proc. European Conf. Speech Comm. and Technology, EUROSPEECH'96, pp. 987-990, 1996.	<input type="checkbox"/>

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	AM	"Generation of Broadband Speech from Narrowband Speech Based on Linear Mapping," by Y. Nakatoh et al, Proc. European Conf. Speech Comm. and Technology, EUROSPEECH'97, 1997, not translated.	<input type="checkbox"/>	
	AN	"Wideband Speech Recovery from Bandlimited Speech in Telephone Communications," by H. Yasukawa, Proc. Intl. Symp. Circuits and Systems, ISCAS'98, pp. IV-202-IV-205, 1998.	<input type="checkbox"/>	
	AO	"A New Technique for Wideband Enhancement of Coded Narrowband Speech," by J. Epps et al, Proc. IEEE Speech Coding Workshop, SCW'99, 1999.	<input type="checkbox"/>	
	AP	"Bandwidth Expansion of Speech Based on Vector Quantization of the Mel Frequency Cepstral Coefficients," by N. Enbom et al, Proc. IEEE Speech Coding Workshop, SCW'99, 1999.	<input type="checkbox"/>	
	AQ	"Wideband Extension of Telephone Speech Using A Hidden Markov Model," by P. Jax et al, Proc. IEEE Speech Coding Workshop, SCW'00, 2000.	<input type="checkbox"/>	
	AR	"Bandwidth Extension of Narrowband Speech for Low Bit-Rate Wideband Coding," by J-M. Valin et al, Proc. IEEE Speech Coding Workshop, SCW'00, 2000.	<input type="checkbox"/>	

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	AS	"Narrowband to Wideband Conversion of Speech Using GMM Based Transformation," by K-Y. Park et al, Proc. Intl. Conf. Acoust., Speech, Signal Processing, ICASSP'00, pp. 1843-1846, 2000.	<input type="checkbox"/>
	AT	"Low-Band Extension of Telephone-Band Speech," by G. Miet et al, Proc. Intl. Conf. Acoust., Speech, Signal Processing, ICASSP'00, pp. 1851-1854, 2000.	<input type="checkbox"/>
	AU	"Speech Enhancement Via Frequency Bandwidth Extension Using Line Spectral Frequencies," by S. Chennoukh et al, Proc. Intl. Conf. Acoust., Speech, Signal Processing, ICASSP'01, 2001.	<input type="checkbox"/>
	AV	"Frequency Recovery of Narrow-band Speech Using Adaptive Spline Neural Networks," by A. Uncini et al, Proc. Intl. Conf. Acoust., Speech, Signal Processing, ICASSP'99, 1999.	<input type="checkbox"/>
	AW	"A 14 kb/s Wideband Speech Coder with a Parametric Highband Model," by A. McCree, Proc. Intl. Conf. Acoust., Speech, Signal Processing, ICASSP'00, pp. 1153-1156, 2000.	<input type="checkbox"/>
	AX	"Hi-Bin: An Alternative Approach to Wideband Speech Coding," by R. Taori, Proc. Intl. Conf. Acoust., Speech, Signal Processing, ICASSP'00, pp. 1157-1160, 2000.	<input type="checkbox"/>

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	AY	"An Embedded Adaptive Multi-Rate Wideband Speech Coder," by A. McCree, Proc. Intl. Conf. Acoust., Speech, Signal Processing, ICASSP'01, 2001.	<input type="checkbox"/>
	AZ	"A Candidate Proposal for a 3GPP Adaptive Multi-Rate Wideband Speech Codec," by C. Erdmann, Proc. Intl. Conf. Acoust., Speech, Signal Processing, ICASSP'01, 2001.	<input type="checkbox"/>
	BA	"High-Frequency Regeneration in Speech Coding Systems," by J. Makhoul et al, Proc. Intl. Conf. Acoust., Speech, Signal Processing, ICASSP'79, pp. 428-431, 1979.	<input type="checkbox"/>
	BB	"Speech Analysis and Synthesis by Linear Prediction of the Speech Wave," by B. S. Atal et al, Journal Acoust. Soc. Am., Vol. 50, No. 2, (Part 2), pp. 637-655, 1971.	<input type="checkbox"/>
	BC	"Direct Estimation of the Vocal Tract Shape by Inverse Filtering of Acoustic Speech Waveforms," by H. Wakita, IEEE Trans. Audio and Electroacoust., Vol. AU-21, No. 5, pp. 417-427, Oct. 1973.	<input type="checkbox"/>
	BD	"Estimation of Vocal-Tract Shapes from Acoustical Analysis of the Speech Wave: The State of the Art," by H. Wakita, IEEE Trans. Acoustics, Speech, Signal Processing, Vol. ASSP-27, No. 3, pp. 281-285, June 1979.	<input type="checkbox"/>

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BE		"Determination of the Geometry of the Human Vocal Tract by Acoustic Measurements," by M. R. Schroeder, Journal Acoust. Soc. Am., Vol. 41, No. 4, (Part 2), 1967.	<input type="checkbox"/>
BF		"Techniques for Estimating Vocal-Tract Shapes from the Speech Signal," by J. Schroeter et al, IEEE Trans. Speech and Audio Processing, Vol. 2, No. 1, Part II, pp. 133-150, Jan. 1994.	<input type="checkbox"/>
BG		"Hierarchical Interpretation of Fractal Image Coding and Its Applications," by Z. Baharav et al, Chapter 5, Y. Fisher, Ed., Fractal Image Compression: Theory and Applications to Digital Images, Springer-Verlag, New York, 1995, pp. 97-117.	<input type="checkbox"/>
BH		"Beyond Nyquist: Towards the Recovery of Broad-Bandwidth Speech from Narrow-Bandwidth Speech," by C. Avendano, Proc. European Conf. Speech Comm. and Technology, EUROSPEECH'95, pp. 165-168, Madrid, Spain 1995.	<input type="checkbox"/>
BI		"Wideband Re-Synthesis of Narrowband Celp-Coded Speech Using Multiband Excitation Model," by C-F. Chan, Proc. Intl. Conf. Spoken Language Processing, ICSLP'96, pp. 322-325, 1996.	<input type="checkbox"/>
BJ		"Wideband Extension of Narrowband Speech for Enhancement and Coding," by J. Epps, School of Electrical Engineering and Telecommunications, The University of New South Wales, Sept. 2000, pp. 1-155.	<input type="checkbox"/>

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